

Test Report

Prepared for: BK Technologies, Inc

Model: BKR9000

Description: Multi-Band Portable Radio VHF/UHF/700/800

FCC ID:-K95BKR9000-2
ISED ID: 2116A-BKR9000-2

To

CC_ Part 15.247
FCC_ Part 15.407
ISED_RSS-247 issue 2 (February 2017)

Date of Issue: March 29, 2023

On the behalf of the applicant:

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Test Report Revision History

Revision	Date	Revised By	Reason for Revision
1.0	3/29/2023	Greg Corbin	Original Document
2.0	5/15/2023	Greg Corbin	Removed reference to b/g modes for UNII bands 1, 2A, 2C in the modulation table on page 7 and 16.
3.0	5/24/2023	Greg Corbin	Added AC line conducted emission test data on page 14 Added additional simultaneous transmission notes to page 20 of this report, Annex B1 and Annex B2 for clarification. Added test notes to page 13 Added Duty Cycle information to page 7. Removed all references to UNII 2A and 2C from test report

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Test Results Summary

Specification		Test Name	Pass, Fail, N/A	Comments
FCC	ISED			
15.203	RSS-GEN 6.8	Antenna Requirements	Pass	Internal Antenna
15.207 15.407(b)(9)	RSS-GEN 8.8	Line Conducted Emissions	Pass	
15.247(b) 15.407(a)(1), (a)(2)	RSS-247 5.4(d) RSS-247 6.2.2, 6.2.3, 6.2.4	Conducted Output Power	Pass	Refer to module test report
15.247(e) 15.407(a)(1),(2)(3)	RSS-247 5.2(b) RSS-247 6.2.2, 6.2.3, 6.2.4	Power Spectral Density	Pass	Refer to module test report
15.247(a)(2) 15.403 15.407(a)(2) 15.407(e)	RSS-GEN 6.7 RSS-247 5.2(a) RSS-247 6.2.2, 6.2.3,	26dB Occupied Bandwidth	Pass	Refer to module test report
	RSS-GEN 6.7 RSS-247 6.2.2, 6.2.3,	99% Occupied Bandwidth		
15.205(a) 15.209(a) 15.247(d) 15.407(b)(1),(2),(3)(4),(9),(10)	RSS-247 Section 5.5 RSS-247 6.2.2, 6.2.3, 6.2.4	Undesirable or Unwanted Emissions	Pass	Refer to module test report
§15.205 §15.407(b)(1),(2),(3)(4),(9),(10)	RSS-247 Section 5.5 RSS-247 6.2.2, 6.2.3, 6.2.4	General Field Strength Limits (Restricted Bands and Radiated Emission limits)	Pass	
ANSI C63.10(5.10.6) FCC KDB 996369 D01v02 (VII)	ANSI C63.10(5.10.6)	Simultaneous Transmission	Pass	
§15.407(g)	RSS-GEN 8.11	Frequency Stability	Pass	Refer to module test report

Statements of conformity are reported as:

- Pass - the measured value is below the acceptance limit, *acceptance limit = test limit*.
- Fail - the measured value is above the acceptance limit, *acceptance limit = test limit*.

References

References	Description
CFR47, Part 15, Subpart B	Unintentional Radiators
CFR47, Part 15, Subpart C	Intentional Radiators
CFR47, Part 15, Subpart E	Unlicensed Nation Information Infrastructure Devices (U-NII)
RSS-GEN_ Issue 5_April 2018	General Requirements for Compliance of Radio Apparatus
RSS-247_ Issue 2_Febuary 2017	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices
ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
ANSI C63.10-2013	American National standard for testing Unlicensed Wireless Devices
ANSI C63.4-2014	Method and Measurements of Radio-Noise Emissions from low-Voltage Electrical and Electronic Equipment in the range 9kHz to 40GHz.
ISO/IEC 17025:2017	General requirements for the Competence of Testing and Calibrations Laboratories
KDB 644545 D03	Guidance for IEEE 802 11ac New Rules
KDB 789033 D02	General U-NII Test Procedures New Rules V01
KDB 926956 D01	U-NII Transition Plan
KDB 996369 D01v02	Module Equipment Authorization Guide v02

ANAB

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The tests results contained within this test report all fall within our scope of accreditation, unless noted below.

Please refer to <http://www.compliancetesting.com/labscope.html> for current scope of accreditation.



FCC Site Reg. #349717

IC Site Reg. #2044A-2

Standard Test Conditions and Engineering Practices

Except as noted herein, the following conditions and procedures were observed during the testing.

In accordance with ANSI C63.10-2009, and unless otherwise indicated in the specific measurement results, the ambient temperature of the actual EUT was maintained within the range of 10° to 40°C (50° to 104°F) unless the particular equipment requirements specified testing over a different temperature range. Also, unless otherwise indicated, the humidity levels were in the range of 10% to 90% relative humidity.

Environmental Conditions		
Temp (°C)	Humidity (%)	Pressure (mbar)
19.1 – 25.4	17.9 – 43.3	956.7 - 984

Measurement results, unless otherwise noted, are worst-case measurements.

EUT Description

Model: BKR-9000

Description: Multi-Band Portable Radio VHF/UHF/700/800

Firmware: 6.5.8.81

Software: 5.8.82f

DSP: 5.8.54

Serial Number: 01, 07

PMN: BKR9000-2

HVIN: BKR9000-2

Additional Information:

The EUT is a LMR multi-band radio with a WIFI and BT module.

Manufacturer	Module	FCC ID	ISED ID
Texas Instruments	WIFI and BT Module WL18DBMOD	Z64-WL18DBMOD	4511-WL18DBMOD

This module contains 2.4 GHz and 5 GHz WIFI bands and 2.4 GHz Bluetooth as noted below.

Band	Frequency Range (MHz)	Modulation
2.4 GHz WIFI	2412 - 2462	802.11b : DSSS 802.11 g/n : OFDM
2.4 GHz Bluetooth	2402 - 2480	Bluetooth BR (1Mbps: GFSK) Bluetooth EDR (2 Mbps: $\pi/4$ -DQPSK) Bluetooth EDR (3 Mbps: 8 DPSK)
2.4 GHz BT LE	2402 - 2480	Bluetooth LE (GFSK)
UNII-1	5150 - 5250	WLAN 11a/n HT20/HT40
UNII-3	5725 - 5850	802.11a/n: OFDM

This filing will utilize the module conducted data from the module certification reports that are included with this filing.

Radiated Spurious emissions was recorded for the worst-case modes of operation.

Worse case was determined by using the guidelines per C63.10_ 5.6.2.2 Determining worse-case mode

5.6.2.2 b) Spurious emissions—Measure the mode with the highest output power and the mode with the highest output power spectral density for each modulation family (e.g., OFDM and direct sequence spread spectrum).

From the module test reports, here are the worse-case modes of operation per guidance from C63.10 section 5.6.2.2 (b)

1. UNII-1_ worse case PSD (highest PSD output) was the same for 11a 6Mbps and HT20 MCS0 modes @ 5220 MHz, worst case Output Power (highest output power) was for HT40 MCS0 @ 5230 MHz
2. UNII-3_ worse case PSD (highest PSD output) was for 11a 6Mbps mode @ 5785 MHz, worse case Output Power (highest output power) was for 11a 6Mbps @ 5780 MHz
3. 2.4 GHz WIFI_ worse case PSD (highest PSD output) was for 11b 1Mbps mode @ 2412 MHz, worse case Output Power (highest output power) was for 11g 6Mbps @ 2437 MHz
4. 2.4 GHz BT_ worse case PSD (highest PSD output) was for GFSK_1Mbps mode @ 2440 MHz, worse case Output Power (highest output power) was for GFSK_1Mbps @ 2440 MHz
5. BT LE_ Highest power is at 2.402 GHz_ GFSK_ 1Mbps

Simultaneous transmission was recorded for each combination of transmitters that can operate at the same time.

The manufacturer declared the following transmitters can be operated simultaneously.

LMR + BT
LMR + WIFI 2.4GHz
LMR +WIFI 5GHz

For simultaneous transmission, radiated spurious emissions was recorded with one LMR frequency in each band transmitting simultaneously with each WIFI and BT transmitter.

Simultaneous Transmission Test Matrix								
LMR Band			VHF	UHF	700		800	
LMR Freq Range (MHz)			150.8 - 174	380 - 520	769 - 775	799 - 805	806 - 815	851 - 860
LMR Test Frequency			161.625	459.65	774.975	804.975	814.975	859.975
WIFI / BT Band	Operating Mode	Test Freq (MHz)						
UNII 1	802.11a_6Mbps	5220	X	X	X	X	X	X
UNII 3	802.11a_6Mbps	5785	X	X	X	X	X	X
2.4 GHz WIFI	11b_1 Mbps_	2412	X	X	X	X	X	X
BT BR/EDR	GFSK_1Mbps	2440	X	X	X	X	X	X
BT Hopping Mode	GFSK_1Mbps	N/A	X	X	X	X	X	X

EUT Operation during Tests

The EUT is battery powered with the nominal voltage set to 7.2 vdc.
The output power was set to maximum for all tests.

Antenna Gain

The manufacturer provided the following gains for the WIFI and BT modules

Band	Frequency (MHz)	Gain (dBi)
2.4 GHz BT / WIFI	2400	-4.65
2.4 GHz BT / WIFI	2450	-3.75
2.4 GHz BT / WIFI	2500	-6.15
5 GHz BT / WIFI	5150	-1.05
5 GHz BT / WIFI	5500	-0.35
5 GHz BT / WIFI	5850	-4.85

Accessories:

Qty	Description	Manufacturer	Model	S/N
1	Battery, Li-ion Rechargeable	BK	BKR0102	N/A
1	Battery Charger	BK	BKR0300	N/A
1	ITE Power Supply for BKR0300	Leader Electronics	MU12B8120100-A1	N/A
1	Battery Eliminator	BK	N/A	N/A
!	PTT Microphone	BK	BKR0204	N/A
1	Antenna	BK	BKR0813	N/A
1	Antenna	BK	BKR0892-180	N/A
1	Antenna	BK	BKR0893-148-E	N/A
1	Antenna	BK	BKR0893-148-E20	N/A

Cables: None

Modifications: None

Duty Cycle and Transmission Duration

Engineer: Greg Corbin

Test Date: 5/24/2023

Test Procedure

The duty cycle for the Part 15C transmitters was less than 98%.

The Duty Cycle and Transmission Duration was measured and met the requirements of C63.10-2013 sections 11.6 for 2.4 GHz and section 12.2 for UNII bands.

Duty Cycle and Transmission Duration Summary Table

Description	Unit	2.4 GHz WIFI	2.4 GHz WIFI	2.4 GHz WIFI	2.4 GHz BT	5 GHz WIFI	5 GHz WIFI	5 GHz WIFI
Freq	MHz	2432	2412	2412	2441	5220	5220	5220
mode	---->	11a/g 6M	11b 1M	11a/g 54M	1 Mbps	11a/g 6M	11n MCS0 20 MHz	11n MCS0 40 MHz
1 cycle	ms	1.191	1.584	0.8437	3.756	1.203	1.062	1.309
T	ms	0.385	0.6572	0.2729	2.906	0.3902	0.3647	0.6132
T	us	385	657.2	272.9	2906	390.2	364.7	613.2
Duty cycle	%	32.33	41.49	32.35	77.37	32.44	34.34	46.84
>50/T	kHz	129.87	76.08	183.22	17.21	128.14	137.10	81.54
# sweep pts	NA	8000	8000	8000	8000	8000	8000	8000
sweep time	us	3000	4910	3000	15460	3000	3000	5000
time /pt	us	2.67	1.63	2.67	0.52	2.67	2.67	1.60
# of pts across T	NA	144.4	403.4	102.3	5615.8	146.3	136.8	383.3
RBW	MHz	3	3	3	3	3	3	3
VBW	MHz	8	8	8	8	8	8	8

In all test modes, the RBW/VBW was >50/T and the # of points across T was >100 per C63.10 section 11.6 and 12.2 requirements.

Field Strength of Spurious Radiation

Engineer: Greg Corbin

Test Date: 3/23/2023

Test Procedure

The EUT was setup in accordance with ANSI C63.10. 2013. The EUT was placed on non-conductive platform at a height of 0.8 meters above the ground plane of the semi-anechoic chambers. The EUT was rotated 360 degrees and the receive antenna raised and lowered to find the maximum emissions from 30MHz to the 10th harmonic of the fundamental.

The EUT was set to transmit at maximum power.

This LMR radio will utilize the WIFI and BT conducted test data as part of this filing.

Radiated Spurious emissions was recorded for the worse-case modes of operation for each WIFI and BT band. Refer to page 8 for description of how worse case modes for each band were determined.

For the 2.4 GHz WIFI and BT operation, the unwanted emissions were tested to the 12.247, -20 dBc limit. Any unwanted emission the falls within the 15.205 restricted band was tested to the t 15.209 limit.

For the 5 GHz WIFI operation, the unwanted emissions were tested to the 15.407, -27 dBm limit. Any unwanted emission the falls within the 15.205 restricted band was tested to the 15.209 limit.

The RBW was set to 100 kHz for measurements below 1 GHz and 1 MHz for measurements above 1 GHz. The VBW was set to 3 times the RBW.

For 30 – 1000 MHz, the tests were performed with a peak detector with the trace set to max hold. Any emission over the limit, the measurement was repeated with a quasi-peak detector. No emissions were over the limit.

For 1 – 40 GHz, the tests were performed with a peak detector with the trace set to max hold. Any emission over the limit, the measurement was repeated with an average detector. No emissions were over the limit.

When using the average detector, the # of points was set to be greater than (2 x span/RBW).

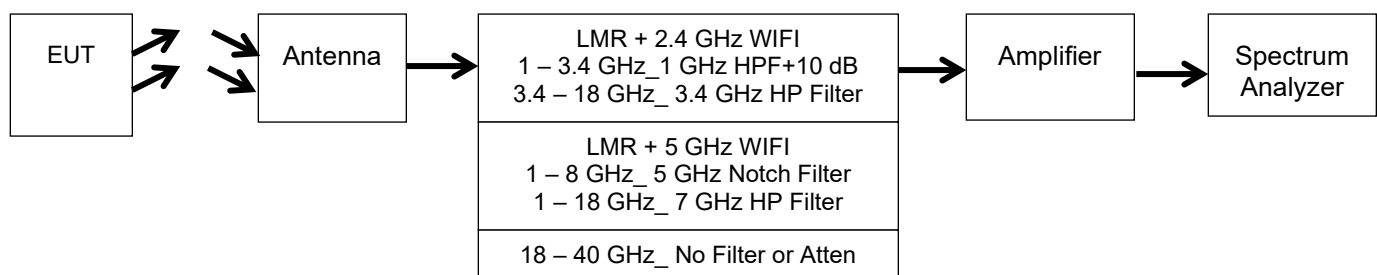
Test distance = 3m from 30 MHz – 18 GHz.

Test distance = 1m from 18 – 40 GHz.

Test Setup below 1000MHz



Test Setup above 1000MHz



Radiated Spurious Emissions Summary Test Table_2.4 GHz WIFI and BT

Mode of Operation		Tuned Frequency	Spurious Frequency	Measured Fundamental Level	Measured Spurious Level		Specification Limit	Result
		MHz	MHz	dBuV	dBuV	dBc	dBc	P / F
WIFI	11b_1M	2412	14616	100	49.5	-50.5	-20	Pass
WIFI	11a_6M	2432	17512	103.7	49.9	-53.8	-20	Pass
BT BR	1Mbps	2440	2426.8	104	54	-50	-20	Pass
BT	2 Mbps π	2440	14693	99.9	50	-49.9	-20	Pass
BT	3 Mbps 8-	2440	2376.9	100	52.9	-47.1	-20	Pass
BT LE	1 Mbps	2402	2426.8	97.3	50.6	-46.7	-20	Pass
BT Hopping mode		N/A	2488.3	96.7	52.7	-44	-20	Pass

Radiated Spurious Emissions Summary Test Table_5 GHz WIFI

Mode of Operation		Tuned Frequency	Spurious Frequency	Measured Spurious Level	Specification Limit	Result
		MHz	MHz	dBm	dBm	P / F
UNII-1	11a 6M	5220	34597.5	-32.7	-27	Pass
UNII-1	11n MCS0 40MHz	5230	33251	-35.6	-27	Pass
UNII-3	11a 6M	5785	33143.3	-35.2	-27	Pass

For all measurements, a peak detector set to max hold was used.

A sufficient number of sweeps were used to capture the maximum value of the emission.

In all cases, the peak value of the emission is below the specified peak or average limit for the emission being measured.

Annex A1 thru A2 Radiated Spurious Emission

Refer to Annex A1 for Radiated Spurious Emission plots with 2.4 GHz WIFI and BT

Refer to Annex A2 for Radiated Spurious Emission plots with 5 GHz WIFI

A/C Powerline Conducted Emission

Engineer: Greg Corbin

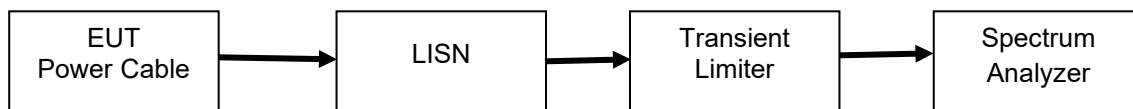
Test Date: 5/23/2023

Test Procedure

The EUT power cable was connected to a LISN and the monitored output of the LISN was connected to a transient limiter, which then connected directly to a spectrum analyzer. The conducted emissions from 150 kHz to 30 MHz were measured and compared to the specification limits.

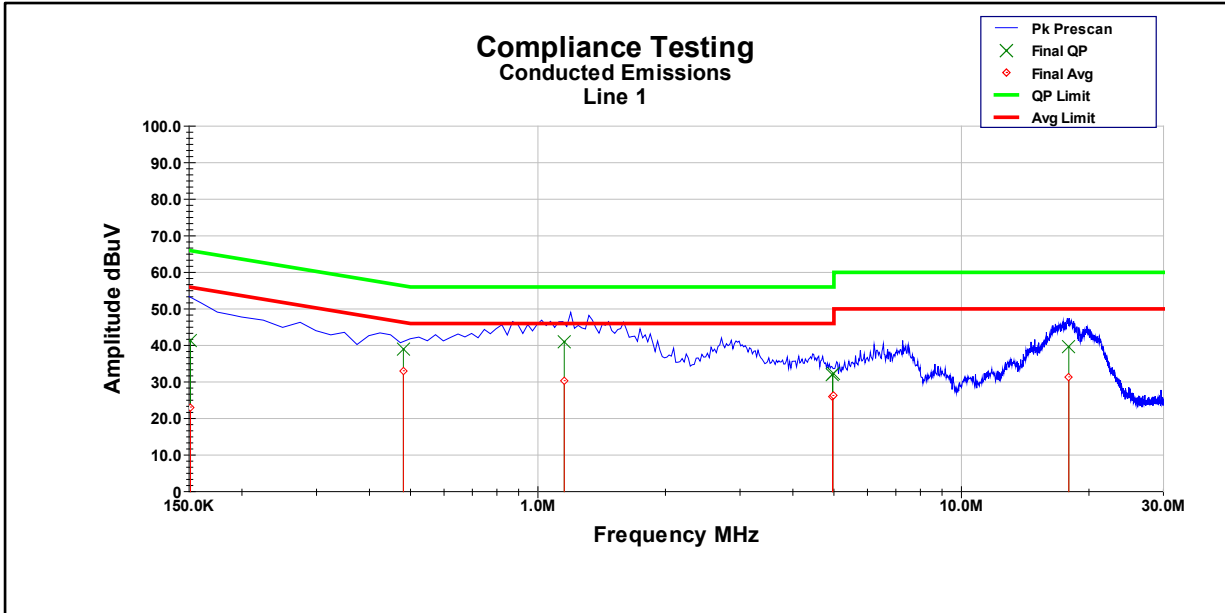
The EUT was set to transmit on 1 LMR frequency set to 774.975 MHz and 1 2.4 GHz WIFI frequency set to 2437 MHz. A fully discharged battery was used at the start of the test.

Test Setup



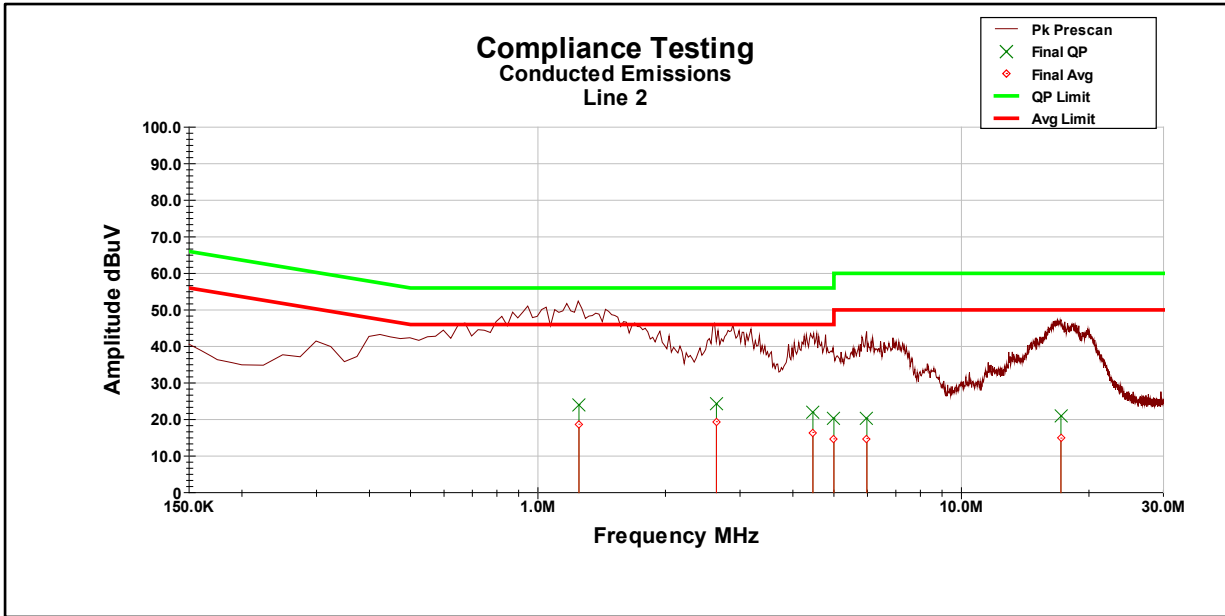
Conducted Emission Test Results

Line 1 Test Results



Frequency (MHz)	Raw QP dBuV	Raw Avg dBuV	Path Loss dB	Final QP dBuV	Final Avg dBuV	QP Limit dBuV	QP Margin dB	Avg Limit dBuV	Avg Margin dB
151.19 KHz	31.60	13.50	9.60	41.20	23.10	66.00	-24.70	56.00	-32.80
481.13 KHz	29.00	23.10	10.00	39.00	33.10	56.50	-17.60	46.50	-13.50
1.1535 MHz	31.00	20.30	10.10	41.10	30.30	56.00	-14.90	46.00	-15.70
4.9612 MHz	21.90	15.80	10.10	32.00	25.90	56.00	-24.00	46.00	-20.10
4.9719 MHz	22.10	16.20	10.10	32.20	26.30	56.00	-23.80	46.00	-19.70
17.924 MHz	29.10	20.90	10.50	39.60	31.40	60.00	-20.40	50.00	-18.60
Final = Raw + Path Loss									
Margin = Final - Limit									

Line 2 Test Results



Frequency	Raw QP	Raw Avg	Path Loss	Final QP	Final Avg	QP Limit	QP Margin	Avg Limit	Avg Margin
(MHz)	dBuV	dBuV	dB	dBuV	dBuV	dBuV	dB	dBuV	dB
1.2495 MHz	14.08	8.70	10.00	24.10	18.70	56.00	-31.90	46.00	-27.30
2.6383 MHz	14.24	9.30	10.10	24.30	19.40	56.00	-31.70	46.00	-26.60
4.4588 MHz	11.79	6.40	10.10	21.90	16.50	56.00	-34.10	46.00	-29.50
4.9996 MHz	10.24	4.60	10.10	20.40	14.70	56.00	-35.60	46.00	-31.30
5.9814 MHz	10.20	4.70	10.10	20.30	14.80	60.00	-39.70	50.00	-35.20
17.177 MHz	10.50	4.50	10.40	20.90	14.90	60.00	-39.10	50.00	-35.10
Final = Raw + Path Loss									
Margin = Final - Limit									

Simultaneous Transmission

Engineer: Greg Corbin

Test Date: 3/6/2023

Measurement Procedure

The EUT was setup in accordance with ANSI C63.10. 2013. The EUT was placed on non-conductive platform at a height of 0.8 meters above the ground plane of the semi-anechoic chambers. The EUT was rotated 360 degrees and the receive antenna raised and lowered to find the maximum emissions from 30MHz to the 5th harmonic of the fundamental.

The EUT was set to transmit at maximum power.

Radiated Spurious emissions for simultaneous transmission was recorded for the worse-case modes of operation for each combination of the LMR and WIFI/BT that can transmit simultaneously.

Refer to page 8 for description of how worse case modes for each band were determined.

The manufacturer has declared the following combination of transmitters can operate simultaneously.

LMR + BT
LMR + WIFI 2.4GHz
LMR +WIFI 5GHz

Simultaneous transmission was recorded for each WIFI / BT mode transmitting simultaneously with the LMR transmitter, for each LMR band of operation as listed on page 8.

Additional Simultaneous Transmission notes:

1. Test 1 LMR freq for each band with 1 Part 15 transmitter freq for each Part 15 transmitter.
2. The MFR has declared only 1 Part 15 transmitter at a time can operate simultaneously with the LMR radio.
3. Part 15 transmitter parameters were selected from Module test reports, using the highest output power / PSD combination.
4. Below 1 GHz, Limits for UNII Bands 1, 3 are 15.209 limits (43.5 dBuV/m@3m) , use Pk or QP detector
5. Above 1 GHz, Limits for UNII Bands 1, 3 are -27 dBm/MHz (EIRP limit?), use Pk detector
6. 15.247 transmitter spurious limit = 20 dBc
7. Verify any freq in restricted bands meet the 15.209 limit
8. Per KDB 996369 D04 Module Integration Guide v02, Pg 4 Footnote 6, simultaneous transmission testing is only required up to the 5th harmonic of the highest frequency generated by the EUT
9. LMR was set to C4FM Modulation

30 - 1000 MHz Notes:

1. For all bands except VHF, Use a notch filter + 6 dB attn for the LMR frequency,
2. For VHF, used notch filter and no attenuator for LMR Freq
3. Measure 30 - 1000 MHz, with LMR TX On and Part 15 TX off, store trace
4. Measure 30 - 1000 MHz, with LMR TX Off and Part 15 TX on, store trace
5. Measure 30 - 1000 MHz, with LMR TX On and Part 15 TX on, store trace
6. Review test results and determine if any signals that are from the Part 15 TX or from the simultaneous transmission are over the 43 dBuV/m limit.
7. For each LMR freq, the LMR ref trace (LMR TX On, part 15 TX off) is only recorded 1 time, then the Part 15 TX is recorded, then both LMR TX and Part 15 TX is recorded.
8. Peak detector, max hold.
9. No spurious emissions were over the 43 dBuV/m limit.

1 - 3.4 GHz Notes_ LMR + 2.4 GHz WIFI + BT

1. Used 1 GHz HPF + 10 dB attn at RX antenna output
2. For 859.975 MHz LMR freq, additional notch filter was used for the 859.975 MHz freq.
3. Peak det, max hold

3.4 - 18 GHz_ LMR + 2.4 GHz WIFI + BT

1. Used 3.4 GHz HPF
2. Average det, max hold.
3. When using the average detector, the # of points was set to be greater than (2 x span/RBW).

1 - 8 GHz Notes_ LMR and 5 GHz WIFI:

1. Used a 1 GHz HPF for the LMR freq + NF for 5 GHz WIFI
2. Peak Det, max hold

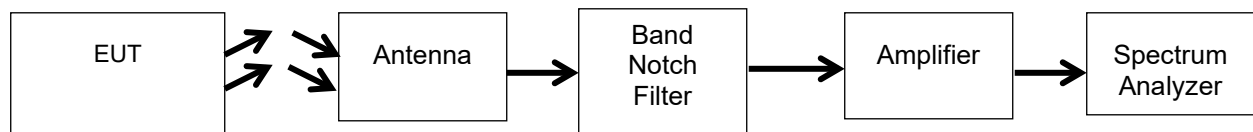
8 -18 GHz Notes (LMR + 5 GHz WIFI)

1. Used 7 - 18 GHz HPF
2. Peak Det, max hold

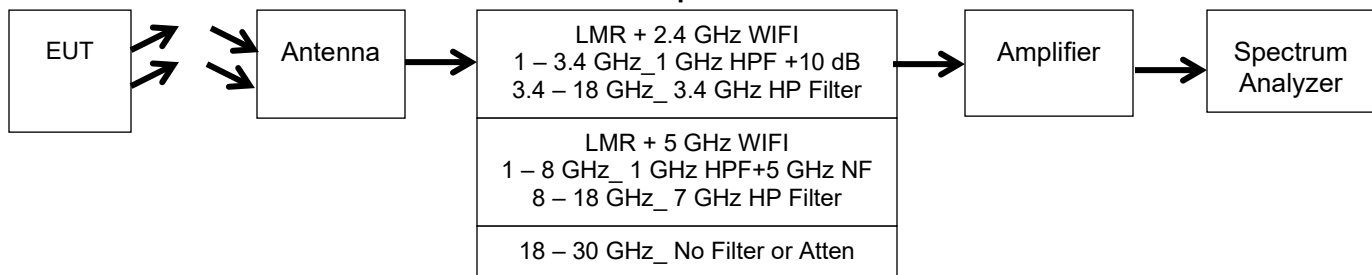
18 - 30 GHz Notes:

1. No HPF filter or attenuator was required.
2. The 18 - 30 GHz Horn antenna waveguide provided enough attenuation for the 5 GHz WIFI
3. Only the 5 GHz WIFI required testing above 18 GHz
4. Peak Det, max hold

Test Setup below 1000MHz



Test Setup above 1000MHz



Simultaneous Transmission Test Summary Table_2.4 GHz WIFI/BT and LMR

Mode of Operation		Tuned Frequency	LMR TX Frequency	Spurious Frequency	Measured Fundamental Level	Measured Spurious Level		Limit	Result
		MHz	MHz	MHz	dBuV	dBuV	dBc	dBc	P / F
2.4 GHz WIFI	11b_1M DSSS	2412	161.625	17701.7	100	49.3	-50.7	-20	Pass
2.4 GHz WIFI	11b_1M DSSS	2412	459.65	14722.4	100	50.2	-49.8	-20	Pass
2.4 GHz WIFI	11b_1M DSSS	2412	774.975	14647.7	100	50.1	-49.9	-20	Pass
2.4 GHz WIFI	11b_1M DSSS	2412	804.975	2445.1	100	54.2	-45.8	-20	Pass
2.4 GHz WIFI	11b_1M DSSS	2412	814.975	2580.5	100	56.7	-43.3	-20	Pass
2.4 GHz WIFI	11b_1M DSSS	2412	859.975	4130.9	100	50.3	-49.7	-20	Pass
2.4 GHz BT BR	1Mbps GSK	2440	161.625	4804.1	104	51.2	-52.8	-20	Pass
2.4 GHz BT BR	1Mbps GSK	2440	459.65	2467.7	104	52	-52	-20	Pass
2.4 GHz BT BR	1Mbps GSK	2440	774.975	2325.5	104	51.8	-52.2	-20	Pass
2.4 GHz BT BR	1Mbps GSK	2440	804.975	2415.3	104	56.3	-47.7	-20	Pass
2.4 GHz BT BR	1Mbps GSK	2440	814.975	4804.1	104	51.8	-52.2	-20	Pass
2.4 GHz BT BR	1Mbps GSK	2440	859.975	2580.2	104	55.7	-48.3	-20	Pass
BT Hopping mode		N/A	161.625	2490.7	96.7	52.6	-44.1	-20	Pass
BT Hopping mode		N/A	459.65	2381.2	96.7	53.6	-43.1	-20	Pass
BT Hopping mode		N/A	774.975	1552.6	96.7	52.9	-43.8	-20	Pass
BT Hopping mode		N/A	804.975	4815.8	96.7	51.2	-45.5	-20	Pass
BT Hopping mode		N/A	814.975	4937.6	96.7	50.8	-45.9	-20	Pass
BT Hopping mode		N/A	859.975	4180.9	96.7	51.6	-45.1	-20	Pass

Simultaneous Transmission Test Summary Table_5 GHz WIFI and LMR

Mode of Operation		Tuned Frequency		Spurious Frequency	Measured Spurious Level	Specification Limit	Result
		MHz		MHz	dBm	dBm	P / F
UNII-1	11a 6M	5220	161.625	29992.3	-32	-27	Pass
UNII-1	11a 6M	5220	459.65	29694.7	-31.8	-27	Pass
UNII-1	11a 6M	5220	774.975	29785.1	-32.2	-27	Pass
UNII-1	11a 6M	5220	804.975	29804.6	-31.7	-27	Pass
UNII-1	11a 6M	5220	814.975	29879.5	-31.3	-27	Pass
UNII-1	11a 6M	5220	859.975	29811.3	-32	-27	Pass
UNII-3	11a 6M	5785	161.625	29283.3	-31.9	-27	Pass
UNII-3	11a 6M	5785	459.65	29360.1	-32.1	-27	Pass
UNII-3	11a 6M	5785	774.975	29932.3	-31.8	-27	Pass
UNII-3	11a 6M	5785	804.975	29986.1	-31.5	-27	Pass
UNII-3	11a 6M	5785	814.975	29973.1	-31.9	-27	Pass
UNII-3	11a 6M	5785	859.975	29914.1	-31.8	-27	Pass

Annex B1 thru B2 Simultaneous Transmission

Refer to Annex B1 for LMR + 2.4 GHz WIFI / BT plots

Refer to Annex B2 for LMR + 5 GHz WIFI plots

Notes for Annex B plots

For the simultaneous transmission spurious emission plots, 3 plots are provided for each measurement.

1 plot shows the LMR transmitter on and the Part 15 transmitter off (trace 1).

LMR spurious signals are marked for later comparison to the plot with both transmitters on.

A second plot shows the Part 15 transmitter on and the LMR transmitter off (trace 2). All Part 15 transmitter spurious signals are marked and meet the limits for the Part 15 transmitter.

A third plot shows the LMR transmitter and the Part 15 transmitter on.

In all cases, the spurious emissions meet the spurious emission limits for the transmitter creating the spurious emission.

In no simultaneous transmission measurements did the 2 transmitters produce any spurious emissions to be over the limits for the rule part being tested.

Measurement Uncertainty

Measurement Uncertainty for Compliance Testing is listed in the table below.

The reported expanded uncertainty has been estimated at a 95% confidence level (k=2)

Measurement Type	Expanded Uncertainty
Conducted Emissions, AC Powerline	± 3.28 dB
Radiated Emissions_30 – 1000 MHz	± 4.82 dB
Radiated Emissions_1 – 18 GHz	± 5.73 dB
Frequency Error	± 22 Hz
Conducted RF Power	± 0.98 dB
Conducted Spurious Emission	± 2.49 dB
AC Voltage	± 2.3 %
DC Voltage	± 0.12 %
Temperature	± 1.0 deg C
Humidity	± 4.32 %

Test Equipment Utilized

Description	Manufacturer	Model #	CT Asset #	Last Cal Date	Cal Due Date
Horn Antenna	EMCO	3116	i00085	3/14/23	3/14/25
Horn Antenna	EMCO	3115	i00103	2/15/23	2/15/25
Tunable Notch Filter	Eagle	TNF-1-(250-850MHz)	i00124	Verified on: 2/23/23	
Bi-Log Antenna	Chase	CBL6111C	i00267	8/10/22	8/10/24
Horn Antenna	ARA	DRG-118/A	i00271	8/11/22	8/11/24
Temp./humidity/pressure monitor	Omega Engineering	iBTHX-W-5	i00686	1/5/23	1/5/24
Temperature Chamber	Tenney	Tenney II Benchmaster	i00287	Verified on: 2/24/23	
Data Logger	Fluke	Hydra Data Bucket	i00343	6/23/22	6/23/23
Vector Signal Generator	Agilent	E4438C	i00348	6/14/22	6/14/23
Spectrum Analyzer	Textronix	RSA5126A	i00424	10/11/22	10/11/23
3 Meter Semi-Anechoic Chamber	Panashield	3 Meter Semi-Anechoic Chamber	i00428	7/17/20	7/17/23
Highpass Filter (1 GHz)	K&L	7IH40-980/T6000-O/O	i00432	Verified on: 2/23/23	
Voltmeter	Fluke	179	i00488	6/8/22	6/8/23
MXE EMI receiver	Keysight	N9038A	i00552	2/23/23	2/23/24
Attenuator, 20 dB, 50W	Mini-Circuits	BW- N20W50+	i00611	Verified on: 1/5/23	
Preamplifier	Eravant	SBB-0115034018-2F2F-E3	i00650	Verified on: 2/8/23	
Spectrum Analyzer	Agilent	PSA E4448A	i00688	11/9/22	11/9/23
Tunable Band Reject Filter	Telonic Berkeley	TTR 190-3EE	S/N: 970276-5	Verified on: 2/8/23	
Tunable Band Reject Filter	Wainwright	WRCT946.1/946.1-943.6/951.6-30/5SS	SN 19	Verified on: 1/12/23	

In addition to the above listed equipment standard RF connectors and cables were utilized in the testing of the described equipment. Prior to testing these components were tested to verify proper operation.

END OF TEST REPORT